Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A high-speed cell search and channel estimation apparatus using a ~~DPSK-based~~ differential phase shift keying (DPSK) based distributed sample acquisition (D^2SA) technique, comprising:

a distributed sample acquisition (DSA) spreading section to pre-sample b state values of at least one main sequence ~~generators~~ generator that ~~generate~~ generates at least one ~~first~~ main sequence, and spread and scramble user data whose constellation is pre-rotated by scrambling sequences generated using the ~~main sequences~~ at least one main sequence; and

a sample spreading section to modulate state samples outputted from the DSA spreading section to ~~differential phase shift keying (DPSK)~~ DPSK symbols, and spread the modulated symbols by ~~a first~~ an igniter sequence to output spread symbols.

2. (Currently Amended) The apparatus of claim 1, wherein the DSA spreading section comprises:

the at least one ~~first~~ main sequence generator to generate the at least one ~~first~~ main sequence;

a time-advanced parallel sampling section to pre-sample states of the at least one ~~first~~ main sequence ~~generators~~ generator;

at least one spreader to spread the ~~input~~ user data by quadrature Walsh codes; and

at least one scrambler to scramble the ~~input~~ user data spread by the quadrature Walsh codes by a complex type scrambling code generated from the at least one ~~first~~ main sequence generator.

3. (Currently Amended) The apparatus of claim 1, wherein the sample spreading section comprises:

a phase shift keying (PSK) symbol mapping section to map the state samples outputted from the DSA spreading section onto a complex symbol and output corresponding PSK symbols ~~X_n~~;

a DPSK encoding section to encode ~~the~~ DPSK symbols ~~f_n~~ by adding a phase, integrated until ~~the~~ a previous symbol time, to a phase of the PSK ~~symbol~~ symbols ~~X_n~~ outputted from the PSK symbol mapping section;

at least one igniter sequence generator to generate ~~first~~ igniter sequences to spread the ~~generated~~ DPSK symbols ~~f_n~~; and

a spreader to spread the DPSK symbols ~~f_n~~ by complex igniter sequences generated from [[a first]] the at least one igniter sequence generator, and output a state signal.

4. (Currently Amended) A high-speed cell search and channel estimation apparatus using a ~~DPSK-based~~ differential phase shift keying (DPSK) based distributed sample acquisition (D^2SA) technique, comprising:

a sample despreading section to acquire a corresponding igniter sequence from a state signal outputted from a transmitter, despread the state signal using the acquired igniter sequence, and ~~modulate~~ demodulate the despread state signal;

a distributed sample acquisition (DSA) despreading section to synchronize transmitter and receiver sequence generators by comparing state sample values of [[a]] at least one main sequence generator that generates at least one ~~second~~ main ~~sequences~~ sequence with ~~the~~ state sample values demodulated by the sample despreading section, and despread and descramble ~~the~~ spread user data by a descrambling sequence generated using [[a]] the at least one main sequence corresponding to ~~the~~ a synchronization timing; and

a channel estimator to estimate a channel gain and a carrier phase by multiplying a value obtained by DPSK-encoding the state sample values for the at least one main sequence generator of the DSA despreading section by the state signal despread by the sample despreading section, and multiplying a spread output value by a filtered value thereof, and output a multiplied value for use in user data despreading and descrambling of the DSA despreading section.

5. (Currently Amended) The apparatus of claim 4, wherein the sample despreading section comprises:

at least one ~~second~~ igniter sequence generator to generate ~~second~~ igniter sequences;

a despreader to despread the state signal ~~received~~ from the ~~second~~ igniter sequences generated from the at least one ~~second~~ igniter sequence generator;

a symbol correlation section to perform a correlation detection with respect to the state signal despread by the ~~second~~ igniter sequences;

a decoder to DPSK-decode an output value $g_{s,n}$ of the symbol correlation section; and

a PSK symbol demapping section to detect the symbols decoded by the decoder and output state samples.

6. (Currently Amended) The apparatus of claim 4, wherein the DSA despreading section comprises:

~~at~~ the at least one ~~second~~ main sequence generator to generate the at least one ~~second~~ main sequence;

a parallel sampling section configured to sample states of the at least one ~~second~~ main sequence ~~generators~~ generator in conformity with a sampling timing provided

from at least one ~~second~~ igniter sequence ~~the generators~~ generator of the sample despreading section;

a parallel comparing section configured to compare state samples outputted from the sample despreading section with state samples outputted from the parallel sampling section;

a parallel correction section to repeatedly correct states of the at least one ~~second~~ main sequence generator in accordance with a correction timing provided from the at least one ~~second~~ igniter sequence ~~generators~~ generator of the sample despreading section and a comparison result of the parallel comparing section;

a descrambler to descramble the data signal received from the DSA spreading section by complex type descrambling sequences generated from the at least one ~~second~~ main sequence generator;

a despreader to despread the signal descrambled by the scrambling sequences by quadrature Walsh codes;

a data symbol correlation section to correlation-integrate the signal despread by the quadrature Walsh ~~code~~ codes through the despreader in a unit of a data symbol; and

a multiplier to multiply the estimation value of the channel estimator by the output of the data symbol correlation section and output a synchronized data signal.

7. (Currently Amended) The apparatus of claim 4, wherein the channel estimator comprises:

a depletion encoding section to depletion-encode the state sample values for the at least one main sequence generator of the DSA despreading section;

a first multiplier to multiply an output of the depletion encoding section and the state signal despread by the sample despreading section;

a filter to filter an output value of the multiplier; and

a second multiplier to multiply the value outputted from the filter by the value outputted from the depletion encoding section, and output the channel estimation value to estimate the channel gain and the carrier phase.

8. (Currently Amended) A high-speed cell search and channel estimation apparatus using a ~~DPSK-based~~ differential phase shift keying (DPSK) based distributed sample acquisition (D^2SA) technique, comprising:

a transmitter configured to sample a plurality of state values ~~by generating~~ of at least one first main sequence, modulate the state samples into ~~differential phase shift keying (DPSK)~~ DPSK symbols, spread the modulated DPSK symbols by a first igniter sequence, and transmit the spread symbols as a state signal, wherein the transmitter spreads ~~the~~ constellation pre-rotated user data by a scrambling sequence using the at least one first main sequence, and transmits the spread user data; and

a receiver configured to acquire ~~the~~ a corresponding first igniter sequence from the state signal outputted from the transmitter, despread the state signal by the acquired first igniter sequence, demodulate the despread state signals, synchronize ~~its respective generator sequence~~ transmitter and receiver generators by comparing state sample values of ~~the~~ at least one second main sequence ~~generators~~ generator which ~~generate one or more~~ generates at least one second main ~~sequences~~ sequence with the demodulated state sample values, and despread and descramble the user data from the transmitter using the at least one second main sequence corresponding to ~~the~~ a synchronization timing and a channel estimator.

9. (Currently Amended) The apparatus of claim 8, wherein the transmitter comprises:

a distributed sample acquisition (DSA) spreading section to pre-sample b state values of at least one first main sequence ~~generators~~ generator that ~~generate~~ generates at least one first main sequence, and spread and scramble user data whose constellation is pre-rotated by scrambling sequences generated using the at least one first main sequence; and

a sample spreading section to modulate ~~the~~ state samples outputted from the DSA spreading section to DPSK symbols, and spread the modulated symbols by the first igniter sequence to output the spread symbols.

10. (Currently Amended) The apparatus of claim 9, wherein the DSA spreading section comprises:

the at least one first main sequence generators to generate the at least one first main sequence;

a time-advanced parallel sampling section to pre-sample states of the at least one first main sequence generator;

at least one spreader to spread the ~~input~~ user data by quadrature Walsh codes; and

at least one scrambler to scramble the ~~input~~ user data spread by the quadrature Walsh codes by a complex type scrambling code generated from the at least one first main sequence generator.

11. (Currently Amended) The apparatus of claim 9, wherein the sample spreading section comprises:

a phase shift keying (PSK) symbol mapping section to map the state samples outputted from the DSA spreading section onto a complex symbol and output a corresponding PSK symbols ~~X_n~~;

a DPSK encoding section to encode ~~the~~ DPSK symbols ~~f_n~~ by adding ~~the~~ a phase, integrated until ~~the~~ a previous symbol time, to ~~the~~ a phase of the PSK ~~symbol~~ symbols ~~X_n~~ outputted from the PSK symbol mapping section;

at least ~~on~~ one first igniter sequence generator to generate first igniter sequences to spread the generated DPSK symbols ~~f_n~~; and

a spreader to spread the DPSK symbols ~~f_n~~ by the complex igniter sequences generated from the at least one first igniter sequence generator, and output the state signal.

12. (Currently Amended) The apparatus of claim 8, wherein the receiver comprises:

a sample despreading section to acquire a corresponding igniter sequence from the state signal outputted from the transmitter, despread the input state signal by the acquired igniter sequence, and ~~modulate~~ demodulate the despread state signal;

a distributed sample acquisition (DSA) ~~DSA~~ despreading section to synchronize the transmitter and receiver sequence generators by comparing state sample values of ~~its~~ at least one second main sequence generator that generates at least one second main sequence with the state sample values demodulated by the sample despreading section, and despread and descramble the spread user data by a descrambling sequence generated using the at least one second main sequence corresponding to ~~the~~ a synchronization timing; and

a channel estimator to estimate a channel gain and a carrier phase by multiplying a value obtained by DPSK-encoding the state sample values for the at least one second main sequence generator of the DSA despreading section by the state signal despread

by the sample despreading section and multiplying a spread output value by a low-pass-filtered value thereof, and output a multiplied value for use in user data despreading and descrambling of the DSA despreading section.

13. (Currently Amended) The apparatus of claim 12, wherein the sample despreading section comprises:

at least one second igniter sequence generator to generate second igniter sequences;

a despreader to despread ~~a~~ the state signal ~~received~~ from the second igniter sequences generated from the at least one second igniter sequence generator; and

a symbol correlation section to perform a correlation detection with respect to the state signal despread by the second igniter sequences.

14. (Previously Presented) The apparatus of claim 13, wherein the sample despreading section further comprises:

a decoding section to DPSK-decode ~~the~~ an output value $g_{s,n}$ of the symbol correlation section; and

a PSK symbol demapping section to detect the symbols decoded by the decoding section and output ~~the~~ state samples.

15. (Currently Amended) The apparatus of claim 12, wherein the DSA despreading section comprises:

~~at~~ the least one second main sequence generator to generate the at least one second main ~~sequences~~ sequence;

a parallel sampling section to sample states of the at least one second main sequence ~~generators~~ generator in conformity with ~~the~~ a sampling timing provided from the at least one second igniter sequence ~~generators~~ generator of the sample despreading section;

a parallel comparing section to compare state samples outputted form the sample despreading section with state samples outputted from the parallel sampling section; and

a parallel correction section to repeatedly correct the states of the at least one second main sequence generator in accordance with a correction timing provided from the at least one second igniter sequence ~~generators~~ generator of the sample despreading section and a comparison result of the parallel comparing section.

16. (Currently Amended) The apparatus of claim 15, wherein a state of the at least one second main sequence generated from the at least one second main sequence generator coincide with a state of the first main sequence of the DSA spreading section.

17. (Currently Amended) The apparatus of claim 15, wherein the DSA despreading section further comprises:

a descrambler to descramble a data signal received from ~~a~~ the DSA spreading section by the complex type descrambling sequences generated by the at least one second main sequence generator;

a despreader to despread a signal descrambled by the scrambling sequences by the quadrature Walsh codes;

a data symbol correlation section to correlation-integrate a signal despread by the quadrature Walsh ~~code~~ codes through the despreader in the unit of a data symbol; and

a multiplier to multiply an estimation value of the channel estimator by the output of the data symbol correlation section and output a finally synchronized data signal.

18. (Currently Amended) The apparatus of claim 12, wherein the channel estimator comprises:

a depletion encoding section to depletion-encode the state sample values for the at least one second main sequence generator of the DSA despreading section;

a first multiplier to multiply an output of the depletion encoding section and the state signal despread by the sample despreading section;

a filter to filter an output value of the multiplier; and

a second multiplier to multiply a value outputted from the filter by a value outputted from the depletion encoding section, and output the channel estimation value to estimate the channel gain and the carrier phase.

19. (Currently Amended) The apparatus of claim 18, wherein the depletion encoding section comprises:

a ~~PSK-~~ phase shift keying (PSK) symbol mapping section to map the state samples outputted from the DSA despreading section onto ~~the~~ respective complex symbols ~~X_n~~ as PSK symbols; and

an encoding section to produce ~~the~~ DPSK symbol ~~f_n~~ by adding ~~the~~ a phase, integrated until ~~the~~ a previous symbol time, to ~~the~~ a phase of the PSK ~~symbol X_n~~ symbols.

20. (Currently Amended) A method of high-speed cell searching using ~~a DPSK-based~~ differential phase shift keying (DPSK) based distributed sample acquisition (D^2SA) technique, comprising:

pre-sampling b state values of [[a]] at least one main sequence generator that generates at least one main sequence;

~~differential phase-shift keying (DPSK)~~ DPSK-modulating the sampled state values into DPSK-modulated symbol values;

multiplying respective user data by the DPSK-modulated symbol values;

transmitting a state signal obtained by spreading the DPSK-modulated symbol values by a generated igniter sequence, and transmitting a data signal obtained by modulating the respective user data multiplied by the DPSK-modulated symbol values;

synchronizing states of ~~the~~ respective transmitter and receiver sequence generators after acquiring the igniter sequence from the transmitted state signal; and

tracking and estimating gains of a pilot channel and a traffic channel and a carrier phase after synchronization.

21. (Currently Amended) A transmitter for a high-speed cell search and channel estimation apparatus using a ~~DPSK-based~~ differential phase shift keying (DPSK) based distributed sample acquisition ~~(D2SA)~~ D^2SA technique, comprising:

at least one sequence generator to generate at least one main sequence;

a distributed sample acquisition (DSA) spreader, configured to pre-sample a prescribed number of state values of the at least one sequence generator, and spread and scramble user data, ~~the~~ a constellation of which is pre-rotated by scrambling sequences generated using the at least one main sequence; and

a sample spreading section, configured to modulate the state samples outputted from the DSA spreader to ~~differential phase shift keying (DPSK)~~ DPSK symbols, and spread the modulated symbols by ~~the~~ at least one igniter sequence to output the spread symbols.

22. (Currently Amended) A receiver for a high-speed cell search and channel estimation apparatus using a ~~DPSK-based~~ differential phase shift keying (DPSK) based distributed sample acquisition ~~(D2SA)~~ D^2SA technique, comprising:

a sample despreader, configured to acquire a corresponding igniter sequence from a state signal outputted from a transmitter, despread the ~~acquired~~ state signal ~~by~~ using the acquired igniter sequence, and ~~modulate~~ demodulate the despread state signal;

a distributed sample acquisition (DSA) ~~DSA~~ despreader, configured to synchronize a transmitter and receiver sequence generator by comparing state sample values of the receiver sequence generator with ~~the~~ state sample values demodulated by the sample despreader, and despread and descramble ~~the~~ spread user data by a descrambling sequence generated using ~~the~~ a main sequence corresponding to a synchronization timing; and

a channel estimator, configured to estimate a channel gain and a carrier phase by multiplying a value obtained by DPSK-encoding the state sample values for the receiver sequence generator of the DSA ~~despreading section~~ despreader by the state signal despread by the sample ~~despreading section~~ despreader, and multiplying a spread output value by a filtered value thereof, and output a multiplied value for use in user data despreading and descrambling of the DSA ~~despreading section~~ despreader.